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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Han et al.

Attorney Docket No.: KLA1P058

Patent: 6,774,646 B1

Issued: August 10, 2004

Title: ELECTRON BEAM INSPECTION SYSTEM USING MULTIPLE ELECTRON BEAMS AND UNIFORM FOCUS AND DEFLECTION MECHANISMS

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first-class mail on September 23, 2004 in an envelope addressed to the Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450.

Signed: Natalie Morgan
Natalie Morgan

REQUEST FOR CERTIFICATE OF CORRECTION OF OFFICE MISTAKE (35 U.S.C. §254, 37 CFR §1.322)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
Attn: Certificate of Correction

Dear Sir:

Attached is Form PTO-1050 (Certificate of Correction) at least one copy of which is suitable for printing. The errors together with the exact page and line number where the errors are shown correctly in the application file are as follows:

SPECIFICATION:

1. Column 1, line 52, change "50mn" to --50nm--. This appears correctly in the patent application as filed on page 2, line 18.

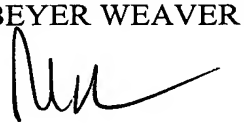
2. Column 6, line 50, change "-5V/nm" to -- -5V/mm--. This appears correctly in the patent application as filed on page 15, line 3.

3. Column 6, line 53, change "TOV" to --FOV--. This appears correctly in the patent application as filed on page 15, line 4.

Patentee hereby requests expedited issuance of the Certificate of Correction because the error lies with the Office and because the error is clearly disclosed in the records of the Office. As required for expedited issuance, enclosed is documentation that unequivocally supports the patentee's assertion without needing reference to the patent file wrapper.

It is noted that the above-identified errors were printing errors that apparently occurred during the printing process. Accordingly, it is believed that no fees are due in connection with the filing of this Request for Certificate of Correction. However, if it is determined that any fees are due, the Commissioner is hereby authorized to charge such fees to Deposit Account 500388 (Order No. KLA1P058).

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP



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bounce off the sample as backscattered electrons. The secondary electrons and/or backscattered electrons are then detected by a detector that is coupled with a computer system. The computer system generates an image that is stored and/or displayed on the computer system. The signal or image from a pattern on the inspected sample is then compared to a reference signal or image corresponding to the same pattern at another location, another wafer, or stored design data. The defects are identified from the differential signal.

The SEM approach provides superior resolution to optical inspection techniques due to the significantly shorter wavelengths used. However, the conventional SEM single electron beam approach provides a low throughput due to several physical limitations of the system.

The use of the electron beam for inspection permits high resolutions to be obtained due to the small sizes of the beam area focused on the wafer ("spot size"). The high resolutions obtainable come at the expense of the throughput. For example, a 300 mm diameter wafer will require an inordinately long inspection period when a single electron beam inspection technique is used. As feature sizes used in semiconductor devices continue to shrink, the smaller spot size of the single electron beam, for example, as small as 50 nm or less, will aggravate the throughput problems. Presently, sequential scanning using a single electron beam combines mechanical movement of a stage holding the sample in a linear direction and an electrical scan of the beam. Achieving significant improvements using the same sequential scanning methods requires unrealistic speeds for the stage movement or the electrical scan.

electrons to the nominal position at the detector, referenced by point 404. In order to provide full coverage of the sample under inspection, AC signal components (e.g., + or –5 V/mm as shown at points 405, 406) are modulated onto the detector signal to achieve the 100 micron scan Field of View ("FOV") shown at point 408. In order to accommodate the electrostatic deflection induced by these AC components to obtain full inspection coverage, the detector size is required to be much larger than the spot size on the inspected wafer. A suitable spot size for electron beam inspection may be about 50 nm. The scan FOV at 100 microns is considerable larger than the spot size. As shown at point 410, the minimum detector size in the example embodiment is approximately 0.2 mm.

FIG. 4B is a plot depicting the performance evaluation for a single beam of the multiple beam inspection system in accordance with one embodiment of the present invention. A predetermined resolution of 50 nm for the spot size in one embodiment requires a semi-convergence angle of approximately 11 mrad and results in a beam current at the target of approximately 100 nA. The plotted results reflect a cathode having an energy spread of 0.8 eV, a column length of 6 mm, and a beam angular current density of 250 micron A/srad.

FIG. 5 is a plot depicting the trajectory calculation for secondary electron detection in accordance with one embodiment. This plot illustrates that at location 502, the electron beam at the location of the extraction electrode has a potential of 6 kV. At the location of the deceleration electrode, as shown at point 504, the potential is reduced to 4 kV. By the time the impinging electrons strike the sample at the wafer plane, illustrated by point 506, the retarding field has reduced the energy to

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CERTIFICATE OF CORRECTION

PATENT NO. : 6,774,646 B1

DATED : August 10, 2004

INVENTOR(S) : Han et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Specifications:

Column 1, line 52, change "50mn" to --50nm--.

Column 6, line 50, change "-5V/nm" to -- -5V/mm--.

Column 6, line 53, change "TOV" to --FOV--.

MAILING ADDRESS OF SENDER:

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